

We claim:

1. A method of scheduling customer access to data from a plurality of data sources, comprising the steps of:
 - creating at least one customer profile for each eligible recipient of said data, said customer profile indicating the customer's preferences for data having predetermined characteristics;
 - creating content profiles for each data source of said data, said content profiles indicating the degree of content of said predetermined characteristics in data from each data source;
 - relating said at least one customer profile with the content profiles for the data available from each data source to the customer at a particular time;
 - determining a subset of data having content profiles which are determined in said relating step to most closely match said at least one customer profile; and
 - presenting said subset of data to said customer for selection.
- 20 2. A method as in claim 1, wherein said relating step comprises the step of determining a distance between a customer profile and a content profile in a characteristic space by calculating an agreement scalar for common characteristics, ac, between said at least one customer profile, cv, and said content profiles, cp, in accordance with the relationship:
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$$ac_{ij} = 1 / [1 + \sum_k w_{ik} |cv_{ik} - cp_{jk}|],$$

for i = a particular customer of a number of customers I, j = a particular data source of a number of data sources J, 30 and k = a particular characteristic of a data source of a number of data source characteristics K, where cv_{ik} is

greater than or equal to 0 and w_{ik} is customer i's normalized weight of characteristic k.

3. A method of scheduling customer access to video programs, comprising the steps of:

- 5 creating at least one customer profile for each customer of said video programs, said customer profile indicating the customer's preferences for predetermined characteristics of the video programs;
- 10 creating content profiles for each video program available for viewing, said content profiles indicating the degree of content of said predetermined characteristics in each video program;
- 15 determining an agreement matrix which relates said at least one customer profile with the content profiles for certain video programs available for viewing by said customer at a particular time;
- 20 determining from said agreement matrix a subset of said video programs having content profiles which most closely match said at least one customer profile; and
- 25 presenting said subset of video programs to the customer for display on the customer's television.

4. A method as in claim 3, wherein said customer profile creating step comprises the step of creating a plurality of customer profiles for each customer, said plurality of customer profiles being representative of the customer's changing preferences for said predetermined characteristics in accordance with time of the day and of the week, and said agreement matrix determining step comprises the step of using different customer profiles for each customer in accordance with the time of the day and of the week.

5. A method as in claim 4, wherein said customer profile creating step comprises the step of creating combined customer profiles for combinations of customers at

a particular customer location at particular times on particular days, and said agreement matrix determining step comprises the step of using different combined customer profiles in accordance with the time of the day and of the
5 week.

6. A method as in claim 3, wherein said agreement matrix determining step comprises the step of comparing said at least one customer profile with the content profiles for each video program available for viewing in a predetermined
10 time period.

7. A method as in claim 3, wherein said agreement matrix determining step comprises the step of determining a distance between a customer profile and a content profile in a characteristic space by calculating an agreement scalar
15 for common characteristics, ac, between said at least one customer profile, cv, and said content profiles, cp, in accordance with the relationship:

$$ac_{ij} = 1 / [1 + \sum_k w_{ik} |cv_{ik} - cp_{jk}|],$$

for i = a particular customer of a number of customers I, j
20 = a particular video program of a number of video programs J, and k = a particular video program characteristic of a number of video program characteristics K, where cv_{ik} is greater than or equal to 0 and w_{ik} is customer i's normalized weight of characteristic k.

25 8. A method as in claim 7, wherein said subset determining step comprises the steps of sorting said video programs in an order of ac indicating increasing correlation and selecting as said subset a predetermined number of said video programs having the values for ac indicating the most
30 correlation.

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9. A method as in claim 3, comprising the further steps of receiving customer identity information and determining from said customer identity information which customer profile to use in said agreement matrix determining 5 step.

10. A method of scheduling transmission of video programs to a plurality of customers, comprising the steps of:

creating at least one customer profile for each of said 10 plurality of customers of said video programs, said customer profile indicating the customers' preferences for predetermined characteristics of the video programs;

creating content profiles for each video program available for transmission to said customers, said content 15 profiles indicating the degree of content of said predetermined characteristics in each video program;

determining an agreement matrix which relates said at least one customer profile with the content profiles for certain video programs available for transmission to said 20 customers at a particular time;

determining from said agreement matrix a subset of said video programs having content profiles which most closely match said at least one customer profile; and

scheduling said subset of video programs for 25 transmission from a video head end to said plurality of customers for receipt on the customers' televisions.

11. A method as in claim 10, wherein said customer profile creating step comprises the steps of creating a plurality of customer profiles for each customer, said 30 plurality of customer profiles being representative of the customer's changing preferences for said predetermined characteristics in accordance with time of the day and of the week, and forming said at least one customer profile from the customer profiles available at a particular time of 35 the day and of the week, said agreement matrix determining

step comprising the step of using a customer profile created from customer profiles created in accordance with the time of the day and of the week.

12. A method as in claim 11, wherein said customer profile creating step comprises the steps of creating combined customer profiles for combinations of customers at a particular customer location at particular times on particular days, and forming said at least one customer profile from the combined customer profiles available at a particular time of the day and of the week, said agreement matrix determining step comprising the step of using a customer profile created from combined customer profiles in accordance with the time of the day and of the week.

13. A method as in claim 10, wherein said agreement matrix determining step comprises the step of comparing said at least one customer profile with the content profiles for each video program available for transmission during a predetermined time period.

14. A method as in claim 10, wherein said agreement matrix determining step comprises the step of determining a distance between a customer profile and a content profile in a characteristic space by calculating an agreement scalar for common characteristics, ac, between said at least one customer profile, cv, and said content profiles, cp, in accordance with the relationship:

$$ac_{ij} = 1 / [1 + \sum_k w_{ik} |cv_{ik} - cp_{jk}|],$$

for i = a particular customer of a number of customers I, j = a particular video program of a number of video programs J, and k = a particular video program characteristic of a number of video program characteristics K, where cv_{ik} is

greater than or equal to 0 and w_{ik} is customer i's normalized weight of characteristic k.

15. A method as in claim 14, wherein said subset determining step comprises the steps of sorting said video programs in an order of ac indicating increasing correlation and selecting as said subset a predetermined number of said video programs having the values for ac indicating the most correlation.

16. A method as in claim 14, wherein said scheduling step comprises the steps of:

- (a) determining a video program j which most closely matches the customer profiles of said plurality of customers of said video programs;
- (b) scheduling said video program j for receipt by said plurality of customers and decrementing a number of channels available for transmission of video programs to said plurality of customers;
- (c) when said number of channels available for transmission of video programs to a particular customer of said plurality of customers reaches zero, removing said particular customer from said plurality of customers for scheduling purposes; and
- (d) repeating steps (a)-(c) until the number of video programs scheduled for transmission equals the number of channels available for transmission of video programs.

17. A method as in claim 10, comprising the further steps of:

- encoding communications between said video head end and said plurality of customers; and
- 30 transmitting said encoded video programs to said plurality of customers.

18. A method as in claim 17, wherein said encoding step comprises the steps of:

- generating, at a video head end, a seed random number N for seeding a random number generator of the customer's set top terminal;
- 5 encrypting seed random number N using a public key algorithm using a public key P of the video head end to yield encrypted seed random number E(N,P);
- sending the encrypted seed random number E(N,P) to the customer's set top terminal;
- decrypting the encrypted seed random number E(N,P) at 10 the customer's set top terminal using a private key of the customer's set top terminal to yield seed random number N;
- generating a first number for each number i in a sequence K_i at the customer's set top terminal and logically exclusive-ORing said first number in the sequence K_i with a 15 first data word in the decrypted data stream P_i from the video head end, thereby forming a data stream C_i;
- sending the result C_i from the customer's set top terminal to the video head end; and
- decrypting C_i to yield a decrypted P_i by logically 20 exclusive-ORing sequence K_i with C_i.

19. A method of scheduling customer access to data from a plurality of data sources, comprising the steps of:
- creating at least one customer profile for each eligible recipient of said data, said customer profile indicating the 25 customer's preferences for data having predetermined characteristics;
- creating content profiles for each data source of said data, said content profiles indicating the degree of content of said predetermined characteristics in data from each data 30 source;
- monitoring which data sources are actually accessed by each recipient; and
- updating each customer profile in accordance with the content profiles of the data sources actually accessed by 35 that customer to update each customer's actual preferences for said predetermined characteristics.

20. A method of scheduling customer access to video programs, comprising the steps of:

creating at least one customer profile for each customer of said video programs, said customer profile indicating the 5 customer's preferences for predetermined characteristics of the video programs;

creating content profiles for each video program available for viewing, said content profiles indicating the degree of content of said predetermined characteristics in 10 each video program;

monitoring which video programs are actually viewed by each customer; and

15 updating each customer profile in accordance with the content profiles of the video programs actually viewed by that customer to update each customer's actual preferences for said predetermined characteristics.

21. A method as in claim 20, wherein said customer profile creating step comprises the step of creating a plurality of customer profiles for each customer, said 20 plurality of customer profiles being representative of the customer's changing preferences for said predetermined characteristics in accordance with time of the day and of the week, and said updating step comprises the step of updating different customer profiles for each customer in 25 accordance with the time of the day and of the week.

22. A method as in claim 21, wherein said customer profile creating step comprises the step of creating combined customer profiles for combinations of customers at a particular customer location at particular times on 30 particular days, and said updating step comprises the step of updating different combined customer profiles in accordance with the time of the day and of the week.

23. A method as in claim 20, comprising the further steps of receiving customer identity information and

determining from said customer identity information which customer profile to update in said updating step.

24. A method as in claim 20, further comprising the steps of:

5 determining an agreement matrix which relates said at least one customer profile with the content profiles for certain video programs available for viewing by said customer at a particular time;

10 determining from said agreement matrix a subset of said video programs having content profiles which most closely match said at least one customer profile; and

presenting said subset of video programs to the customer as a virtual channel for display on the customer's television.

15 25. A method as in claim 24, wherein said agreement matrix determining step comprises the step of comparing said at least one customer profile with the content profiles for each video program available for viewing in a predetermined time period.

20 26. A method as in claim 24, wherein said agreement matrix determining step comprises the step of determining a distance between a customer profile and a content profile in a characteristic space by calculating an agreement scalar for common characteristics, ac, between
25 said at least one customer profile, cv, and said content profiles, cp, in accordance with the relationship:

$$ac_{ij} = 1 / [1 + \sum_k w_{ik} |cv_{ik} - cp_{jk}|],$$

for i = a particular customer of a number of customers I, j = a particular video program of a number of video programs
30 J, and k = a particular video program characteristic of a number of video program characteristics K, where cv_{ik} is

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greater than or equal to 0 and w_{ik} is customer i's normalized weight of characteristic k.

27. A method as in claim 26, wherein said subset determining step comprises the steps of sorting said video programs in an order of ac indicating increasing correlation and selecting as said subset a predetermined number of said video programs having the values for ac indicating the most correlation.

28. A method as in claim 20, wherein said updating step comprises the steps of adjusting said at least one customer profile, cv_{ik} , for customer i and video program characteristic k, to a new customer profile, cv'_{ik} , in accordance with the equation:

$$cv'_{ik} = cv_{ik} - \Delta(cv_{ik} - cp_{jk}),$$

15 where cp_{jk} represents the degree of video program characteristic k in video program j.

29. A method as in claim 20, wherein said updating step comprises the steps of adjusting customer i's weighting of video program characteristic k, w_{ik} , in said at least one customer profile, cv_{ik} , to a new weighting, w'_{ik} , in accordance with the equation:

$$w'_{ik} = (w_{ik} - \Delta|cv_{ik} - cp_{jk}|) / \sum_k (w_{ik} - \Delta|cv_{ik} - cp_{jk}|)$$

where cp_{jk} represents the degree of video program characteristic k in video program j.

25 30. A method as in claim 20, comprising the further step of updating the content profiles, cp_{jk} , of certain video programs j having video program characteristics k to new content profiles, cp'_{jk} , to update

the customer profiles of customers i who actually watch video program j, in accordance with the equation:

$$cp_{jk}' = cp_{jk} - \Delta (cv_{ik} - cp_{jk}),$$

where cv_{ik} represents the customer profile of customer i for 5 video program characteristic k.

31. A method of scheduling transmission of video programs to a plurality of customers, comprising the steps of:

creating at least one clustered customer profile for 10 each of said plurality of customers of said video programs, said clustered customer profile indicating said plurality of customers' combined preferences for predetermined characteristics of the video programs;

creating content profiles for each video program 15 available for transmission to said customers, said content profiles indicating the degree of content of said predetermined characteristics in each video program;

monitoring which video programs are actually viewed by each customer; and

20 updating each clustered customer profile in accordance with the content profiles of the video programs actually viewed by said plurality of customers to update the actual preferences of said plurality of customers for said predetermined characteristics.

25 32. A method as in claim 31, wherein said clustered customer profile creating step comprises the steps of creating a plurality of customer profiles for each customer, said plurality of customer profiles being representative of the customer's changing preferences for 30 said predetermined characteristics in accordance with time of the day and of the week, and forming said at least one clustered customer profile from the customer profiles available at a particular time of the day and of the week,

said updating step comprising the step of updating different clustered customer profiles in accordance with the time of the day and of the week.

33. A method as in claim 32, wherein said
5 clustered customer profile creating step comprises the steps
of creating combined customer profiles for combinations of
customers at a particular customer location at particular
times on particular days, and forming said at least one
clustered customer profile from the combined customer
10 profiles available at a particular time of the day and of
the week, said updating step comprising the step of updating
different clustered customer profiles in accordance with the
time of the day and of the week.

34. A method as in claim 31, further comprising
15 the steps of:

- determining an agreement matrix which relates said at
least one clustered customer profile with the content
profiles for certain video programs available for
transmission to said customers at a particular time;
20 determining from said agreement matrix a subset of said
video programs having content profiles which most closely
match said at least one customer profile; and
scheduling said subset of video programs for
transmission from a video head end to said plurality of
25 customers for receipt on the customers' televisions.

35. A method as in claim 34, wherein said
agreement matrix determining step comprises the step of
comparing said at least one customer profile with the
content profiles for each video program available for
30 transmission during a predetermined time period.

36. A method as in claim 34, wherein said
agreement matrix determining step comprises the step of
determining a distance between a customer profile and a

content profile in a characteristic space by calculating an agreement scalar for common characteristics, ac, between said at least one customer profile, cv, and said content profiles, cp, in accordance with the relationship:

$$ac_{ij} = 1 / [1 + \sum_k w_{ik} |cv_{ik} - cp_{ik}|] ,$$

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for i = a particular customer of a number of customers I, j = a particular video program of a number of video programs J, and k = a particular video program characteristic of a number of video program characteristics K, where cv_{ik} is
10 greater than or equal to 0 and w_{ik} is customer i's normalized weight of characteristic k.

37. A method as in claim 36, wherein said subset determining step comprises the steps of sorting said video programs in an order of ac indicating increasing correlation
15 and selecting as said subset a predetermined number of said video programs having the values for ac indicating the most correlation.

38. A method as in claim 36, wherein said scheduling step comprises the steps of:

20 (a) determining a video program j which most closely matches the customer profiles of said plurality of customers of said video programs;

(b) scheduling said video program j for receipt by said plurality of customers and decrementing a number of channels available for transmission of video programs to said plurality of customers;

(c) when said number of channels available for transmission of video programs to a particular customer of said plurality of customers reaches zero, removing said particular customer from said plurality of customers for scheduling purposes; and

(d) repeating steps (a)-(c) until the number of video programs scheduled for transmission equals the number of channels available.

39. A method as in claim 31, wherein said monitoring step comprises the steps of storing, at each customer's set top terminal, a record of the video programs actually watched by the customer at the customer's location, and polling said set top terminals to retrieve said records of the video programs actually watched by the customers at each of the customer locations.

40. A method as in claim 31, wherein said updating step comprises the steps of adjusting said at least one customer profile, cv_{ik} , for customer i and video program characteristic k, to a new customer profile, cv'_{ik} , in accordance with the equation:

$$cv'_{ik} = cv_{ik} - \Delta(cv_{ik} - cp_{jk}),$$

where cp_{jk} represents the degree of video program characteristic k in video program j.

41. A method as in claim 31, wherein said updating step comprises the steps of adjusting customer i's weighting of video program characteristic k, w_{ik} , in said at least one customer profile, cv_{ik} , to a new weighting, w'_{ik} , in accordance with the equation:

$$w'_{ik} = (w_{ik} - \Delta|cv_{ik} - cp_{jk}|) / \sum_k (w_{ik} - \Delta|cv_{ik} - cp_{jk}|)$$

25 where cp_{jk} represents the degree of video program characteristic k in video program j.

42. A method as in claim 31, comprising the further step of updating the content profiles, cp_{jk} , of certain video programs j having video program

characteristics k to new content profiles, cp_{jk}' , to update the customer profiles of customers i who actually watch video program j, in accordance with the equation:

$$cp_{jk}' = cp_{jk} - \Delta (cv_{ik} - cp_{jk}),$$

- 5 where cv_{ik} represents the customer profile of customer i for video program characteristic k.

43. A method of providing secure digital communications between a video head end and a customer's set top terminal, comprising the steps of:

10 generating, at a video head end, a seed random number N for seeding a random number generator of the customer's set top terminal;

encrypting seed random number N using a public key algorithm using a public key P of the video head end to

15 yield encrypted seed random number E(N, P);

sending the encrypted seed random number E(N, P) to the customer's set top terminal;

20 decrypting the encrypted seed random number E(N, P) at the customer's set top terminal using a private key of the customer's set top terminal to yield seed random number N;

generating a first number for each number i in a sequence K_i at the customer's set top terminal and logically exclusive-ORing said first number in the sequence K_i with a first data word in the decrypted data stream P_i from the

25 video head end, thereby forming a data stream C_i ;

sending the result C_i from the customer's set top terminal to the video head end; and

decrypting C_i to yield a decrypted P_i by logically exclusive-ORing sequence K_i with C_i .

30 44. A method for transmitting video programming from a plurality of video sources to a customer, comprising the steps of:

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receiving at a customer set top terminal video programming data from said plurality of video sources;

providing feedback data from said customer set top terminal indicating at least the video programming selected by that customer through said customer set top terminal during a predetermined time interval;

collecting said feedback data from said customer set top terminal; and

controlling a switch connecting said plurality of video programming sources to respective nodes in a video distribution system so as to selectively transmit newly proposed video programming to customers which is proposed in response to said feedback data.

45. A method of scheduling customer access to data from a plurality of data sources, comprising the steps of:

creating a customer profile for each customer of said plurality of data sources, said customer profile indicating said customer's preferences for predetermined characteristics of the data sources;

monitoring which data sources are actually accessed by each customer; and

updating each customer profile to reflect the frequency of selection of the data sources by customers with customer profiles substantially similar to said each customer

profile.

46. A method as in claim 45, wherein said profile creating step comprises the steps of:

selecting a number of desired groups K into which said customers are divided whereby each customer in a group has a customer profile substantially similar to a customer profile of each other customer in said group;

grouping said customers into K groups so as to minimize:

$$\sum_{\text{clusters}} \sum_{k=1 \text{ to } K} \sum_{\text{customers}} |v_i - v_k|$$

i in k

where $|v_i - v_k|$ is a distance between the vector of characteristics of the data sources accessed by customer i and the centroid of group k; and

5 determining an agreement matrix ac_{ij} , where for each customer i, a jth row of the agreement matrix is a vector v_k for a group k in which customer i belongs.

47. A method of scheduling customer access to data from a plurality of data sources, comprising the steps of:

10 creating at least one customer profile for each eligible recipient of said data, said customer profile including a profile of data previously accessed by said customer;

15 creating content profiles for each data source of said data, said content profiles reflecting the customer profiles of those customers who have previously accessed said data from each data source;

relating said at least one customer profile with the content profiles for the data available from each data source to the customer;

20 determining a subset of data having content profiles which are determined in said relating step to most closely match said at least one customer profile; and

25 presenting said subset of data to said customer for selection.

48. A data transmission system which schedules

25 customer access to data from a plurality of data sources, comprising:

at least one customer profile for each eligible recipient of said data, said customer profile indicating the customer's preferences for data having predetermined 30 characteristics;

content profiles for each data source of said data, said content profiles indicating the degree of content of said predetermined characteristics in data from each data source;

means for relating said at least one customer profile 35 with the content profiles for the data available from each

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data source to the customer at a particular time and for determining a subset of data having content profiles which most closely match said at least one customer profile; and means for presenting said subset of data to said 5 customer for selection.

49. A system as in claim 48, wherein said relating and determining means comprises a processor programmed to determine a distance between a customer profile and a content profile in a characteristic space by calculating an 10 agreement scalar for common characteristics, ac, between said at least one customer profile, cv, and said content profiles, cp, in accordance with the relationship:

$$ac_{ij} = 1 / [1 + \sum_k w_{ik} |cv_{ik} - cp_{jk}|],$$

for i = a particular customer of a number of customers I, j 15 = a particular data source of a number of data sources J, and k = a particular characteristic of a data source of a number of data source characteristics K, where cv_{ik} is greater than or equal to 0 and w_{ik} is customer i's normalized weight of characteristic k.

20 50. A data transmission system which schedules customer access to video programs received from a video head end, comprising:

at least one customer profile for each customer of said 25 video programs, said customer profile indicating the customer's preferences for predetermined characteristics of the video programs;

content profiles for each video program available for viewing, said content profiles indicating the degree of content of said predetermined characteristics in each video 30 program;

an agreement matrix which relates said at least one customer profile with the content profiles for certain video

programs available for viewing by said customer at a particular time;

- means for determining from said agreement matrix a subset of said video programs having content profiles which 5 most closely match said at least one customer profile; and means for presenting said subset of video programs to the customer as at least one "virtual channel" for display on the customer's television.

51. A system as in claim 50, wherein said at least 10 one customer profile comprises a plurality of customer profiles for each customer, said plurality of customer profiles being representative of the customer's changing preferences for said predetermined characteristics in accordance with time of the day and of the week, and said 15 agreement matrix uses different customer profiles for each customer in accordance with the time of the day and of the week.

52. A system as in claim 51, wherein said customer profile comprises combined customer profiles for 20 combinations of customers at a particular customer location at particular times on particular days, and said agreement matrix uses different combined customer profiles in accordance with the time of the day and of the week.

53. A system as in claim 50, further comprising 25 means for transmitting said content profiles to each customer along with electronic program guide data for upcoming television viewing periods.

54. A system as in claim 50, wherein said agreement matrix compares said at least one customer profile 30 with the content profiles for each video program available for viewing in a predetermined time period.

55. A system as in claim 50, wherein said determining means comprises a processor programmed to determine a distance between a customer profile and a content profile in a characteristic space by calculating an 5 agreement scalar for common characteristics, ac, between said at least one customer profile, cv, and said content profiles, cp, in accordance with the relationship:

$$ac_{ij} = 1 / [1 + \sum_k w_{ik} |cv_{ik} - cp_{jk}|],$$

for i = a particular customer of a number of customers I, j 10 = a particular video program of a number of video programs J, and k = a particular video program characteristic of a number of video program characteristics K, where cv_{ik} is greater than or equal to 0 and w_{ik} is customer i's normalized weight of characteristic k.

15 56. A system as in claim 55, wherein said determining means sorts said video programs in an order of ac indicating increasing correlation and selects as said subset a predetermined number of said video programs having the values for ac indicating the most correlation.

20 57. A system as in claim 50, comprising means for inputting customer identity information and for determining from said customer identity information which customer profile to use in calculating said agreement matrix.

25 58. A system of scheduling transmission of video programs from a video head end to a plurality of customers, comprising the steps of:

at least one customer profile for each of said plurality of customers of said video programs, said customer profile indicating the customers' preferences for predetermined 30 characteristics of the video programs;

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- content profiles for each video program available for transmission to said customers, said content profiles indicating the degree of content of said predetermined characteristics in each video program;
- 5 an agreement matrix which relates said at least one customer profile with the content profiles for certain video programs available for transmission to said customers at a particular time;
- means for determining from said agreement matrix a subset of said video programs having content profiles which most closely match said at least one customer profile; and
- means for scheduling said subset of video programs for transmission from said video head end to said plurality of customers for receipt on the customers' televisions.
- 15 59. A system as in claim 58, wherein said at least one customer profile comprises a plurality of customer profiles for each customer, said plurality of customer profiles being representative of the customer's changing preferences for said predetermined characteristics in accordance with time of the day and of the week, each customer profile being available at a particular time of the day and of the week, and said agreement matrix uses a particular customer profile in accordance with the time of the day and of the week.
- 25 60. A system as in claim 59, wherein said customer profile comprises combined customer profiles for combinations of customers at a particular customer location at particular times on particular days, said at least one customer profile being formed from the combined customer profiles available at a particular time of the day and of the week, and said agreement matrix uses a customer profile created from combined customer profiles in accordance with the time of the day and of the week.

61. A system as in claim 58, further comprising means for transmitting said content profiles to each customer along with electronic program guide data for upcoming television viewing periods.

5 62. A system as in claim 58, wherein said agreement matrix compares said at least one customer profile with the content profiles for each video program available for transmission during a predetermined time period.

10 63. A system as in claim 58, wherein said determining means comprises a processor programmed to determine a distance between a customer profile and a content profile in a characteristic space by calculating an agreement scalar for common characteristic s, ac, between said at least one customer profile, cv, and said content 15 profiles, cp, in accordance with the relationship:

$$ac_{ij} = 1 / [1 + \sum_k w_{ik} |cv_{ik} - cp_{jk}|],$$

for i = a particular customer of a number of customers I, j = a particular video program of a number of video programs J, and k = a particular video program characteristic of a 20 number of video program characteristics K, where cv_{ik} is greater than or equal to 0 and w_{ik} is customer i's normalized weight of characteristic k.

25 64. A system as in claim 63, wherein said subset determining means sorts said video programs in an order of ac indicating increasing correlation and selects as said subset a predetermined number of said video programs having the values for ac indicating the most correlation.

30 65. A system as in claim 63, wherein said scheduling means comprises a processor programmed to perform the steps of:

- (a) determining a video program j which most closely matches the customer profiles of said plurality of customers of said video programs;
- (b) scheduling said video program j for receipt by said 5 plurality of customers and decrementing a number of channels available for transmission of video programs to said plurality of customers;
- (c) when said number of channels available for transmission of video programs to a particular customer of 10 said plurality of customers reaches zero, removing said particular customer from said plurality of customers for scheduling purposes; and
- (d) repeating steps (a)-(c) until the number of video programs scheduled for transmission equals the number of 15 channels available for transmission of video programs.

66. A system as in claim 58, further comprising:
means for encoding communications between said video head end and said plurality of customers; and
means for transmitting said encoded video programs to 20 said plurality of customers.

67. A system as in claim 66, wherein said encoding means comprises:

at a customer's set top terminal, a random number generator, means for generating a seed random number N for 25 seeding a random number generator of the video head end, means for encrypting seed random number N using a public key algorithm which uses a public key P of the video head end to yield encrypted seed random number $E(N,P)$, means for sending encrypted seed random number $E(N,P)$ to the video head end, 30 and means responsive to a sequence C_i received from the video head end for forming sequence K_i at the random number generator and logically exclusive-ORing sequence K_i with received sequence C_i to yield a decrypted data stream P_i at the customer's set top terminal; and

- at the video head end, means for decrypting the encrypted seed random number $E(N, P)$ using a private key of the video head end, means for generating said sequence K_i and logically exclusive-ORing each number in said sequence K_i 5 with corresponding words in the encrypted data stream P_i from the customer's set top terminal, thereby forming a data stream C_i , and means for sending the data stream C_i from the head end to the customer's set top terminal.

68. A system for scheduling customer access to
10 data from a plurality of data sources, comprising:
at least one customer profile for each eligible recipient of said data, said customer profile indicating the customer's preferences for data having predetermined characteristics;
- 15 content profiles for each data source of said data, said content profiles indicating the degree of content of said predetermined characteristics in data from each data source;
means for monitoring which data sources are actually accessed by each recipient; and
- 20 means for updating each customer profile in accordance with the content profiles of the data sources actually accessed by that customer to update each customer's actual preferences for said predetermined characteristics.

69. A system for scheduling customer access to
25 video programs received from a video head end, comprising:
at least one customer profile for each customer of said video programs, said customer profile indicating the customer's preferences for predetermined characteristics of the video programs;
- 30 content profiles for each video program available for viewing, said content profiles indicating the degree of content of said predetermined characteristics in each video program;
means for monitoring which video programs are actually
35 viewed by each customer; and

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means for updating each customer profile in accordance with the content profiles of the video programs actually viewed by that customer to update each customer's actual preferences for said predetermined characteristics.

5 70. A system as in claim 69, wherein said at least one customer profile comprises a plurality of customer profiles for each customer, said plurality of customer profiles being representative of the customer's changing preferences for said predetermined characteristics in
10 accordance with time of the day and of the week, and said updating means updates different customer profiles for each customer in accordance with the time of the day and of the week.

15 71. A system as in claim 70, wherein said at least one customer profile comprises combined customer profiles for combinations of customers at a particular customer location at particular times on particular days, and said updating means updates different combined customer profiles in accordance with the time of the day and of the week.

20 72. A system as in claim 69, further comprising means for transmitting said content profiles to each customer along with electronic program guide data for upcoming television viewing periods.

25 73. A system as in claim 69, further comprising means for inputting customer identity information and for determining from said customer identity information which customer profile to update with said updating means.

30 74. A system as in claim 69, further comprising:
means for determining an agreement matrix which relates said at least one customer profile with the content profiles for certain video programs available for viewing by said customer at a particular time and for determining from said

agreement matrix a subset of said video programs having content profiles which most closely match said at least one customer profile; and

means for presenting said subset of video programs to
5 the customer as a virtual channel for display on the
customer's television.

75. A system as in claim 74, wherein said agreement matrix determining means compares said at least one customer profile with the content profiles for each
10 video program available for viewing in a predetermined time period.

76. A system as in claim 74, wherein said agreement matrix determining means determines a distance between a customer profile and a content profile in a
15 characteristic space by calculating an agreement scalar for common characteristics, ac, between said at least one customer profile, cv, and said content profiles, cp, in accordance with the relationship:

$$ac_{ij} = 1 / [1 + \sum_k w_{ik} |cv_{ik} - cp_{jk}|],$$

20 for i = a particular customer of a number of customers I, j = a particular video program of a number of video programs J, and k = a particular video program characteristic of a number of video program characteristics K, where cv_{ik} is greater than or equal to 0 and w_{ik} is customer i's normalized
25 weight of characteristic k.

77. A system as in claim 76, wherein said agreement matrix determining means sorts said video programs in an order of ac indicating increasing correlation and selects as said subset a predetermined number of said video
30 programs having the values for ac indicating the most correlation.

78. A system as in claim 69, wherein said updating means adjusts said at least one customer profile, cv_{ik} , for customer i and video program characteristic k, to a new customer profile, cv'_{ik} , in accordance with the equation:

5 $cv'_{ik} = cv_{ik} - \Delta(cv_{ik} - cp_{jk}),$

where cp_{jk} represents the degree of video program characteristic k in video program j.

79. A system as in claim 69, wherein said updating means adjusts customer i's weighting of video program 10 characteristic k, w_{ik} , in said at least one customer profile, cv_{ik} , to a new weighting, w'_{ik} , in accordance with the equation:

$$w'_{ik} = (w_{ik} - \Delta|cv_{ik} - cp_{jk}|) / \sum_k (w_{ik} - \Delta|cv_{ik} - cp_{jk}|)$$

where cp_{jk} represents the degree of video program 15 characteristic k in video program j.

80. A system as in claim 69, wherein said updating means updates the content profiles, cp_{jk} , of certain video programs j having video program characteristics k to new content profiles, cp'_{jk} , and updates the customer profiles of 20 customers i who actually watch video program j, in accordance with the equation:

$$cp'_{jk} = cp_{jk} - \Delta(cv_{ik} - cp_{jk}),$$

where cv_{ik} represents the customer profile of customer i for video program characteristic k.

25 81. A system for scheduling transmission of video programs from a video head end to a plurality of customers, comprising:

- 65607 P 2017-06-09
- at least one clustered customer profile for each of said plurality of customers of said video programs, said clustered customer profile indicating said plurality of customers' combined preferences for predetermined characteristics of the video programs;
- content profiles for each video program available for transmission to said customers, said content profiles indicating the degree of content of said predetermined characteristics in each video program;
- means for monitoring which video programs are actually viewed by each customer; and
- means for updating each clustered customer profile in accordance with the content profiles of the video programs actually viewed by said plurality of customers to update the actual preferences of said plurality of customers for said predetermined characteristics.
82. A system as in claim 81, wherein said clustered customer profile comprises a plurality of customer profiles for each customer, said plurality of customer profiles being representative of the customer's changing preferences for said predetermined characteristics in accordance with time of the day and of the week, said at least one clustered customer profile being formed from the customer profiles available at a particular time of the day and of the week, and said updating means updates different clustered customer profiles in accordance with the time of the day and of the week.
83. A system as in claim 82, wherein said clustered customer profile comprises combined customer profiles for combinations of customers at a particular customer location at particular times on particular days, said at least one clustered customer profile being formed from the combined customer profiles available at a particular time of the day and of the week, and said

updating means updates different clustered customer profiles in accordance with the time of the day and of the week.

84. A system as in claim 81, further comprising means for transmitting said content profiles to each 5 customer along with electronic program guide data for upcoming television viewing periods.

85. A system as in claim 81, further comprising: means for determining an agreement matrix which relates said at least one clustered customer profile with the 10 content profiles for certain video programs available for transmission to said customers at a particular time, and for determining from said agreement matrix a subset of said video programs having content profiles which most closely match said at least one customer profile; and 15 means for scheduling said subset of video programs for transmission from said video head end to said plurality of customers for receipt on the customers' televisions.

86. A system as in claim 85, wherein said determining means compares said at least one customer 20 profile with the content profiles for each video program available for transmission during a predetermined time period.

87. A system as in claim 85, wherein said determining means comprises a processor programmed to 25 determine a distance between a customer profile and a content profile in a characteristic space by calculating an agreement scalar for common characteristics, ac, between said at least one customer profile, cv, and said content profiles, cp, in accordance with the relationship:

$$ac_{ij} = 1 / [1 + \sum_k w_{ik} |cv_{ik} - cp_{jk}|],$$

for i = a particular customer of a number of customers I, j = a particular video program of a number of video programs J, and k = a particular video program characteristic of a number of video program characteristics K, where cv_{ik} is
5 greater than or equal to 0 and w_{ik} is customer i's normalized weight of characteristic k.

88. A system as in claim 87, wherein said determining means sorts said video programs in an order of ac indicating increasing correlation and selects as said
10 subset a predetermined number of said video programs having the values for ac indicating the most correlation.

89. A system as in claim 87, wherein said scheduling means comprises a processor programmed to perform the steps of:

15 (a) determining a video program j which most closely matches the customer profiles of said plurality of customers of said video programs;

(b) scheduling said video program j for receipt by said plurality of customers and decrementing a number of channels
20 available for transmission of video programs to said plurality of customers;

(c) when said number of channels available for transmission of video programs to a particular customer of said plurality of customers reaches zero, removing said
25 particular customer from said plurality of customers for scheduling purposes; and

(d) repeating steps (a)-(c) until the number of video programs scheduled for transmission equals the number of channels available.

30 90. A system as in claim 81, wherein said monitoring means stores, at each customer's set top terminal, a record of the video programs actually watched by the customer at the customer's location, and polls said set top terminals to retrieve said records of the video programs

actually watched by the customers at each of the customer locations.

91. A system as in claim 81, wherein said updating means adjusts said at least one customer profile, cv_{ik} , for 5 customer i and video program characteristic k, to a new customer profile, cv'_{ik} , in accordance with the equation:

$$cv'_{ik} = cv_{ik} - \Delta(cv_{ik} - cp_{jk}),$$

where cp_{jk} represents the degree of video program characteristic k in video program j.

10 92. A system as in claim 81, wherein said updating means adjusts customer i's weighting of video program characteristic k, w_{ik} , in said at least one customer profile, cv_{ik} , to a new weighting, w'_{ik} , in accordance with the equation:

$$w'_{ik} = (w_{ik} - \Delta|cv_{ik} - cp_{jk}|) / \sum_k (w_{ik} - \Delta|cv_{ik} - cp_{jk}|)$$

where cp_{jk} represents the degree of video program characteristic k in video program j.

93. A system as in claim 81, wherein said updating means updates the content profiles, cp_{jk} , of certain video 20 programs j having video program characteristics k to new content profiles, cp'_{jk} , and updates the customer profiles of customers i who actually watch video program j, in accordance with the equation:

$$cp'_{jk} = cp_{jk} - \Delta(cv_{ik} - cp_{jk}),$$

25 where cv_{ik} represents the customer profile of customer i for video program characteristic k.

94. A system for scheduling customer access to data from a plurality of data sources, comprising:
- at least one customer profile for each eligible recipient of said data, said customer profile including a profile of data previously accessed by said customer;
 - a content profile for each data source of said data, each content profile reflecting the customer profiles of those customers who have previously accessed said data from each data source;
 - means for relating said at least one customer profile with the content profiles for the data available from each data source to the customer;
 - means for determining a subset of data having content profiles which most closely match said at least one customer profile; and
 - means for presenting said subset of data to said customer for selection.
95. A system for providing secure digital communications between a customer's set top terminal and a video head end, wherein said customer's set top terminal, comprises:
- a random number generator;
 - means for generating a seed random number N for seeding a random number generator of the video head end;
 - means for encrypting seed random number N using a public key algorithm which uses a public key P of the video head end to yield encrypted seed random number E(N,P);
 - means for sending encrypted seed random number E(N,P) to the video head end; and
 - means responsive to a sequence C_i received from the video head end for forming sequence K_i at the random number generator and logically exclusive-ORing sequence K_i with received sequence C_i to yield a decrypted data stream P_i at the customer's set top terminal; and
 - said video head end comprises:

means for decrypting the encrypted seed random number $E(N,P)$ using a private key of the video head end;

means for generating said sequence K_i and logically exclusive-ORing each number in said sequence K_i with

5 corresponding words in the encrypted data stream P_i from the customer's set top terminal, thereby forming a data stream C_i ; and

means for sending the data stream C_i from the head end to the customer's set top terminal.

10 96. A video transmission system, comprising:

a plurality of customer set top terminals for receiving video programming data and providing feedback data indicating at least the video programming received by that customer set top terminal during a predetermined time interval;

a video distribution system comprising a switch for selectively transmitting a plurality of video programs from a plurality of video program sources to respective nodes;

20 means for transmitting said plurality of video programs from said respective nodes to corresponding customer set top terminals;

means for collecting said feedback data from said customer set top terminals; and

25 a system controller responsive to said collecting means for controlling said switch so as to schedule the presentation of said plurality of video programs to customers in response to said feedback data.

97. A system for scheduling customer access to data provided by a plurality of data sources, comprising:

30 means for creating a customer profile for each customer of said plurality of data sources, said customer profile indicating said customer's preferences for predetermined characteristics of the data sources;

means for monitoring which data sources are actually accessed by each customer; and

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means for updating each customer profile to reflect the frequency of selection of the data sources by customers with customer profiles substantially similar to said each customer profile.

- 5 98. A method as in claim 97, wherein said means for creating a customer profile comprises processing means which selects a number of desired groups K into which said customers are divided whereby each customer in a group has a customer profile substantially similar to the customer profile of each other customer in said group, groups said customers into K groups so as to minimize:

$$\sum_{\text{clusters}} \sum_{\substack{\text{customers} \\ k=1 \text{ to } K \\ i \text{ in } k}} |v_i - v_k|$$

- 15 where $|v_i - v_k|$ is a distance between the vector of characteristics of the data sources accessed by customer i and the centroid of group k, and determines an agreement matrix ac_{ij} , where for each customer i, a jth row of the agreement matrix is a vector v_k for a group k in which
20 customer i belongs.

99. A multimedia terminal for receiving data from a plurality of data sources, comprising:

- means for storing at least one customer profile indicating a customer's preferences for data having
25 predetermined characteristics;
- means for storing content profiles for each data source of said data, said content profiles indicating the degree of content of said predetermined characteristics in data from each data source;
- 30 processing means for relating said at least one customer profile with the content profiles for the data available from each data source to the customer at a particular time and for determining a subset of data having content profiles which most closely match said at least one customer profile;
35 and

a display guide for presenting said subset of data to said customer for selection.

100. A multimedia terminal as in claim 99, further comprising means for identifying a customer and for providing customer profiles for said customer to said processing means for determining said subset of data for said customer.

101. A multimedia terminal as in claim 99, further comprising means for providing different customer profiles to said processing means in accordance with the time of day and day of the week.

102. A multimedia terminal as in claim 99, wherein said display guide presents said subset of data to the customer as a virtual data channel.

103. A multimedia terminal as in claim 99, further comprising means for storing an electronic program guide, wherein said display guide highlights programs within said electronic program guide which correspond to said subset of data.

104. A multimedia terminal as in claim 99, further comprising an interface which through which said processing means provides upstream data messages.

105. A multimedia terminal as in claim 104, further comprising encrypting means for encrypting said upstream data messages.

106. A method of assisting a customer in the selection of video, music or reading products for purchase or rental through the use of a kiosk comprising a processor, a memory, and a display device, comprising the steps of:

creating content profiles for each video, music or book product, said content profiles indicating the degree of content of predetermined characteristics of said video, music or book products, and storing said content profiles in 5 said memory;

creating from user input into said computerized kiosk at least one customer profile for each customer desiring assistance in the selection of said video, music or book products, said customer profile indicating the customer's 10 preferences for said predetermined characteristics of said video, music or book products, and storing said at least one customer profile in said memory;

said processor relating said at least one customer profile with the content profiles for the video, music or 15 book products available for rental or purchase;

said processor determining a subset of recommended video, music or book products having content profiles which most closely match said at least one customer profile; and

displaying on said display device said subset of 20 recommended video, music or book products as rental or purchase recommendations to said customer.

107. A method as in claim 106, wherein said step of creating said at least one customer profile comprises the 25 steps of receiving identity information from said customer and, if said customer has a customer profile in said memory, retrieving the customer profile for said customer, else, if the customer is a new customer, requesting the customer to input the identity of videos, music or books with 30 characteristics similar to those desired by the new customer, said processor creating a new customer profile by averaging the content profiles of the videos, music or books input by the new customer.

108. A method as in claim 106, wherein said step of 35 creating said at least one customer profile comprises the steps of receiving identity information from said customer

and, if said customer has a customer profile in said memory, retrieving the customer profile for said customer, else, if the customer is a new customer, requesting the customer to input at least one of demographic and psychographic information, said processor creating a new customer profile for said new customer on the basis of said input demographic or psychographic information input by the new customer.

109. A method as in claim 106, wherein said displaying step comprises the step of playing audio and/or 10 visual clips from said subset of recommended video, music or book products on said display device.

110. A method as in claim 106, comprising the further step of updating said at least one customer profile to reflect the content profile of a video, music or book 15 product rented or purchased by said customer.

111. A computerized kiosk for assisting a customer in the selection of video, music or book products for purchase or rental, said kiosk comprising:

a memory including content profiles for each video, 20 music or book product, said content profiles indicating the degree of content of predetermined characteristics of said video, music or book products, and at least one customer profile for each customer desiring assistance in the selection of said video, music or book products, said 25 customer profile indicating the customer's preferences for said predetermined characteristics of said video, music or book products;

a processor which relates said at least one customer profile with the content profiles for the video, music or 30 book products available for rental or purchase and which determines a subset of recommended video, music or book products having content profiles which most closely match said at least one customer profile; and

a display device for displaying said subset of recommended video, music or book products as rental or purchase recommendations to said customer.

5 112. A kiosk as in claim 111, further comprising means for receiving identity information from said customer and, if said customer has a customer profile in said memory, for retrieving the customer profile for said customer, else, if the customer is a new customer, for requesting the
10 customer to input the identity of videos, movies or books with characteristics similar to those desired by the new customer, said processor creating a new customer profile by averaging the content profiles of the videos, music or books input by the new customer.

15 113. A kiosk as in claim 111, further comprising means for receiving identity information from said customer and, if said customer has a customer profile in said memory, for retrieving the customer profile for said customer, else, if the customer is a new customer, for requesting the
20 customer to input at least one of demographic and psychographic information, said processor creating a new customer profile for said new customer on the basis of said input demographic or psychographic information input by the new customer.

25 114. A kiosk as in claim 111, wherein said display device comprises means for playing audio and/or visual clips from said subset of recommended video, music or book products.

30 115. A method as in claim 111, wherein said processor updates said at least one customer profile to reflect the content profile of a video, music or book product rented or purchased by said customer.